

**DATA QUALITY SUMMARY REPORT
FOR PEROXYACETYLNITRATE (PAN) DATA
COLLECTED BY SONOMA TECHNOLOGY, INC.,
DURING THE
CALIFORNIA REGIONAL PM₁₀/PM_{2.5}
AIR QUALITY STUDY**

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1. INTRODUCTION AND OBJECTIVES

The purpose of this Data Quality Summary Report is to provide data users with an understanding of the quality of peroxyacetylnitrate (PAN) data collected by Sonoma Technology, Inc. (STI) for the California Regional PM₁₀/PM_{2.5} Air Quality Study (CRPAQS). **Table M-1** summarizes the sites and dates for which validated PAN concentration measurements are available. The CE-CERT PAN/NO₂ instruments operated from October or November 2000 through February 12, 2001 (see Appendix L). However, PAN data were only validated by CE-CERT for the intensive operating periods (IOPs) shown in Table M-1. These were the only data delivered to ARB and are the basis for the data completeness calculations. PAN concentrations were measured with 1-minute time resolution and averaged to 15-minute and 60-minute values. Data completeness and LQL were calculated for both data sets. Accuracy and precision could not be calculated reliably with this limited data set.

Table M-1. Location and duration of PAN measurements performed by STI during CRPAQS.

Site	Operating Periods with Data Validated by CE-CERT
Angiola Trailer	December 26-28, 2000
Bakersfield	
Bethel Island	January 4-7, 2001
Sierra Nevada Foothills	

Several other documents are available from which to obtain information about the CRPAQS field study and data processing. Sampling locations are described in Wittig et al. (2003). Quality control screening procedures are summarized by Hafner et al. (2003). Results of systems and performance audits and intercomparisons are provided by Bush et al. (2001). No data quality objectives (DQOs) were available for PAN measurements by the PAN/NO₂ instrument.

2. DATA COMPLETENESS

Data completeness for 15-minute and 60-minute PAN data is shown in **Table M-2**. Data capture quantifies the percentage of total records received versus the number expected during the “period of operation” defined by the date ranges in Table M-1. The number of valid data points is divided by the number of captured data points to calculate the data recovery. Validity is defined for this calculation as any data point that has a quality control flag of V0 (valid) or V1 (valid but comprised wholly or partially of below-MDL data). Details of data validation are included in Hafner et al. (2003).

Table M-2. Data completeness values for PAN at each site during two IOPs.

Monitoring Site	Total No. of Records	Expected No. of Records	Percent Capture ^a	No. of Valid Records	Percent Recovery ^b	No. of Suspect Records	No. of Invalid Records	No. of Missing Records
Angiola Trailer (15-minute)	1247	1247	100%	544	44%	24	103	576
Angiola Trailer (60-minute)	312	312	100%	145	47%	17	6	144
Bakersfield (15-minute)	1248	1248	100%	558	45%	17	97	576
Bakersfield (60-minute)	312	312	100%	147	47%	14	7	144
Bethel Island (15-minute)	1248	1248	100%	552	44%	8	112	576
Bethel Island (60-minute)	312	312	100%	153	49%	8	7	144
Sierra Nevada Foothills (15-minute)	1248	1248	100%	250	20%	310	112	576
Sierra Nevada Foothills (60-minute)	311	311	100%	62	20%	98	7	144

^a % of capture = total number of records/expected records*100%

^b % recovery = number of valid records/total number of records

All sites had a 100% data capture rate. Data recovery rates ranged from 20% (Sierra Nevada Foothills, 15- and 60-minute) to 49% (Bethel Island, 60-minute).

3. LOWER QUANTIFIABLE LIMIT

The LQL is the lowest concentration in ambient air that can be measured when processing actual samples. Sources of variability that influence the monitored signal at low concentrations include instrument noise and atmospheric variability. As a measure of this variability, two times the standard deviation of selected 15-minute and 60-minute data was used to estimate the LQL. The selected data were collected during relatively stable periods with concentrations close to zero. This is a conservative estimate of the LQL because it includes the concentration variability of the ambient air. Twelve consecutive data values were used to compute the LQL with the 5-minute data and six data values with the 60-minute data; atmospheric variation generally becomes too great after six hours to calculate a reasonable LQL. Since only half the number of data values were used in the calculation (see “N” in Equation M-1), the 60-minute LQL is expected to be higher than the 5-minute LQL, despite the “smoothing” that occurs when averaging 5-minute to 60-minute values.

The LQL is calculated as shown in Equation M-1. **Table M-3** shows the LQL for the sampling period, as well as the specific data strings used to calculate the LQLs.

$$LQL \approx 2s = 2\sqrt{\frac{\sum (NO_2 - \overline{NO_2})^2}{N - 1}} \quad (M-1)$$

where:

$\overline{NO_2}$ = mean PAN concentration
N = number of measurements
 σ = standard deviation

Table M-3. Time period used to calculate LQL, the LQL, and the corresponding mean PAN concentration during the selected time period.

Type of Data	Time Period Used in LQL Calculation	LQL (ppb)	Mean (ppb)
15-minute	12/27/2000 0900 – 1200 PST	0.0115	0.0450
60-minute	1/4/2001 0300 – 0900 PST	0.0163	0.0733

4. REFERENCES

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